

Approximation Algorithms for Peak-Demand Reduction

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Abstract : Smart grid is emerging as the future power grid, with smart techniques to optimize power consumption and electricity generation. Minimizing peak power consumption under a fixed delay requirement is a significant problem in the smart grid. For this problem, all appliances must be scheduled within a given finite time duration. We consider the problem of minimizing the peak demand under appliances constraints by scheduling power jobs with uniform release dates and deadlines. As the problem is known to be NP-hard, we analyze the performance of a version of the natural greedy heuristic for solving this problem. Our theoretical analysis and experimental results show that the proposed heuristic outperforms existing methods by providing a better approximation to the optimal solution.

Keywords : peak demand scheduling, approximation algorithms, smart grid, heuristics

Conference Title : ICECS 2023 : International Conference on Engineering and Computer Science

Conference Location : New York, United States

Conference Dates : April 24-25, 2023